



2812

In re Application of:

Docket No. 03500.015623

MAHITO SHINOHARA

Appln. No.: 09/875,010

Examiner: P. E. Brock II

Filed: June 7, 2001

Group Art Unit: 2812

For: CHARGE TRANSFER APPARATUS

Date: June 25, 2001

THE COMMISSIONER FOR PATENTS
Washington, D.C. 20231

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JUN 27 2002
TECHNOLOGY CENTER 2800

Sir:

Transmitted herewith is an amendment in the above-identified application.

☒ No additional fee is required.

The fee has been calculated as shown below

CLAIMS AS AMENDED						
	(2) CLAIMS REMAINING AFTER AMENDMENT		(4) HIGHEST NO. PREVIOUSLY PAID FOR	(5) PRESENT EXTRA	RATE	ADDITIONAL FEE
TOTAL CLAIMS	* 14	MINUS	** 20	= 0	x \$9 \$18	\$0.00
INDEP. CLAIMS	* 4	MINUS	*** 4	= 0	x \$42 \$84	\$0.00
Fee for Multiple Dependent claims \$140°/\$280						\$0.00
TOTAL ADDITIONAL FEE FOR THIS AMENDMENT---						\$0.00

* If the entry in Column 2 is less than the entry in Column 4, write "0" in Column 5.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, write "20" in this space.

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, write "3" in this space.

☐ °Verified Statement claiming small entity status is enclosed, if not filed previously.

☐ A check in the amount of \$____ is enclosed.

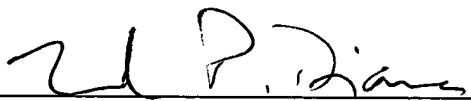
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☐ A check in the amount of \$____ to cover the Extension fee for response with a ____-month extension is enclosed.

☐ A check in the amount of \$____ to cover the Information Disclosure Statement fee is enclosed.

☒ Applicant's undersigned attorney may be reached in our New York Office by telephone at (212) 218-2100 or by facsimile at (212) 218-2200. All correspondence should continue to be directed to our address given below.



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03500.015623

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)
: Examiner: P. E. Brock II
MAHITO SHINOHARA)
: Group Art Unit: 2812
Appln. No.: 09/875,010)
: Filed: June 7, 2001)
: For: CHARGE TRANSFER)
: APPARATUS)
: June 25, 2002

#9/128. for
Reconsideration
ABD and
7/11/02
RECEIVED
JUN 27 2002
TECHNOLOGY CENTER 2800

The Commissioner for Patents
Washington, D.C. 20231

REQUEST FOR RECONSIDERATION

Sir:

In response to the Office Action of April 18, 2002, please consider the following remarks:

This application has been reviewed in light of the Office Action dated April 18, 2002. Claims 1-6 are presented for examination, with Claims 1 and 4 being independent. Favorable reconsideration is requested.

The Office Action has maintained the restriction requirement under which Figs. 3, 6, and 7 have been deemed to relate to Species II, IV, and V, respectively. In this regard, Applicant would like to reiterate that Figs. 6 and 7 show sectional views of a solid-state image pickup element, shown in Fig. 5, which uses a charge transfer element

shown in Fig. 3. This relationship between the figures in question is described in the specification as follows:

Fig. 3 is a sectional view of a charge transfer element according to the second embodiment of the present invention.

Specification at page 15, lines 10-12.

The fourth embodiment of the present invention relates to a solid-state image pickup element using the charge transfer element of the second embodiment described above. The circuit of the solid-state image pickup element is shown in Fig. 5, and its sectional structure is shown in Figs. 6 and 7.

Specification at page 20, lines 5-10 (emphasis added). Thus, Figs. 3, 5, 6, and 7 all relate to the fourth embodiment, and it is therefore respectfully submitted that Species II, IV and V are in fact a single species.

Applicant would also like to reiterate that Claims 1-14 read on Species II-IV-V. The Office Action states that Fig. 3 does not disclose photoelectric conversion portions two-dimensionally arrayed in the semiconductor region, as recited in Claim 7. However, the two-dimensional array of conversion portions are not depicted in Figs. 3, 6, and 7 because these figures are sectional views of the fourth embodiment.

Applicant submits that it is apparent upon a review of Figs. 3, 5, 6, and 7 and the portions of the specification relating to the fourth embodiment (e.g., page 20, line 5 through page 27, line 16) that the figures in question are related to a single embodiment covered by Claims 1-14. Accordingly, Applicant respectfully requests that the Examiner reconsider and restructure the restriction requirement.

Claims 1-6 were rejected under 35 U.S.C. § 103(a) as being obvious from U.S. Patent 4,912,560 (Osawa) in view of U.S. Patent 5,502,318 (Hynecek).

Applicant submits that independent Claims 1 and 4, together with the claims dependent thereon, are patentably distinct from the cited prior art for at least the following reasons.

Claim 1 is directed to a charge transfer apparatus having a semiconductor substrate of one conductivity type and a charge transfer region, of a conductivity type opposite to the conductivity type of the semiconductor substrate, that is formed in the semiconductor substrate and joined to the semiconductor substrate to form a diode. A signal charge input portion is adapted to input a signal charge to the charge transfer region. A signal charge output portion is adapted to accumulate the signal charge transferred from the charge transfer region.

Claim 1 further recites a plurality of independent potential supply portions adapted to supply a potential gradient to the semiconductor substrate. The signal charge in the charge transfer region is transferred by the potential gradient formed by the plurality of potential supply portions.

These features may be understood by referring to the specification and drawings, for example, at Fig. 2, which shows independent potential supply portions (e.g., 12 and 14) that supply a potential gradient to the substrate. As discussed for example at page 14, lines 5-19 and as shown in Fig. 2D, the signal charge in the charge transfer region (e.g., 5) is transferred by the potential gradient formed by the supply portions. Of course,

this example is but one embodiment of the invention and does not limit the scope of the claims.

Osawa, as understood by Applicant, relates to a solid state image sensing device having a number of light-receiving storage elements. Fig. 9 of Osawa shows a light-receiving/storage layer 113, which is a region that accumulates charge corresponding to a pixel (see col. 5, lines 60 - col. 6, line 18). A p-type well 112 is formed in a thin layer under the vertical register 114 resulting in a vertical overflow drain (VOD) structure (see col. 3, lines 19-33). The VOD structure allows charge stored in the vertical register 114 to be discharged to the substrate 111 by applying a low-level voltage to the gate 115. According to Osawa, this configuration significantly shortens the discharge time and obviates the need for a complex, high-speed pulse generation circuit (see col. 3, lines 34-44).

As the Office Action acknowledges, Osawa does not teach or suggest a plurality of independent potential supply portions adapted to supply a potential gradient to the semiconductor substrate to transfer signal charge in the charge transfer region as recited in Claim 1.

The Examiner turns to Hynecek in this regard, which, as understood by Applicant, relates to supplying clocked voltages ϕ_1 , ϕ_2 , and ϕ_3 to transfer charge between virtual gate regions 24, 26, and 28. The potential profile between the virtual gates includes virtual barriers and virtual wells each having two possible states (see Fig. 2 and col. 3, lines 1-17) due to donor implants 50, 52, and 54 (see col. 2, lines 65-67).

The Office Action cites Hynecek's virtual gates as corresponding to the recited independent potential supply portions and asserts that these virtual gates are adapted to supply a potential gradient to the semiconductor region. However, the voltages applied to Hynecek's virtual gates merely change the potential between the gates to switch the level of the potential barriers and wells between their two possible states, as shown in Fig. 2. This switching action allows charge to flow in a manner similar to a bipolar gate. Nowhere does Hynecek teach or suggest that the signal charge in the charge transfer region is transferred by a potential gradient formed by the plurality of potential supply portions, as recited in Claim 1. Thus, even if Hynecek were to be combined with Osawa in the manner hypothesized by the Examiner, the resulting combination still would fail to teach or suggest a plurality of independent potential supply portions adapted to supply a potential gradient to the semiconductor substrate to transfer signal charge in the charge transfer region as recited in Claim 1.

More fundamentally, Applicant notes that Osawa, as a whole, is concerned with the use of a vertical overflow drain structure to achieve charge transfer with a smaller number of discharge operations and a shorter discharge time. Osawa also seeks to obviate the need for a complex, high-speed pulse generation circuit (see col. 3, lines 34-44). Because Osawa already provides a sophisticated means of transferring charge to meet these stated objectives, it is submitted that one of ordinary skill in the art would have had no motivation to turn to Hynecek "in order to obtain charge flow in the semiconductor device", as the Examiner suggests (Office Action at page 3).

Applicant therefore respectfully submits that the combination of Osawa and Hyncecek would not have rendered the claimed invention obvious to one of ordinary skill in the art. This is particularly true in view of the policy of the Patent Office to ensure that “the standard of patentability enunciated by the Supreme Court and by the Congress is applied in each and every case.” M.P.E.P. § 2141 (emphasis in original). This standard of patentability requires that “[a] prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention.” M.P.E.P. § 2141.02 (citing *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984))(emphasis in original).

Accordingly, Applicant submits that Claim 1 is patentable over the cited art, and respectfully requests withdrawal of the rejection under 35 U.S.C. § 103(a).

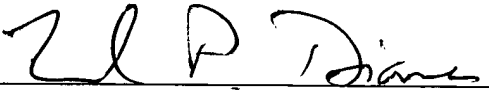
Independent Claim 4 recites features similar to those discussed above with respect to Claim 1 and therefore is also believed to be patentable over Osawa and Hyncecek for the reasons discussed above.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

Applicant's undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,



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